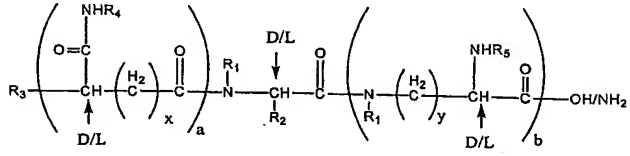
What is claimed is:

1. An isopeptide represented by the general formula (I):



where, if a is 1 then b is 0;
if a is 0 then b is 1;
x and y independently are 1-7;

$R_1$ is H or $CH_3$

$R_2$ is the side chain of an amino acid selected from the group alanine, arginine, asparagine, aspartic acid, cysteine, glutamic acid, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, and valine;

$R_3$ is selected from the group consisting of: H, $NH_2$, NHR, $NR_2$, $^+NR_3$, OH, SH, RO, RS, RSO, $RSO_2$, COR, CSR, COOH, COOR, $CONH_2$, CONHR, $CONR_2$, OCOR, and SCOR, wherein R = alkyl, alkenyl, aryl, aralkyl, or cycloalkyl; and

$R_4$ and $R_5$ are independently a hydrophobic group.

2. The isopeptide according to claim 1, wherein $R_1$ is H.

3. The isopeptide according to claim 1 or claim 2, wherein $R_2$ is the side chain of an amino acid selected from the group consisting of glycine and alanine.

4. The isopeptide according to any one of claims 1 to 3, wherein $R_3$ is H or $NH_2$.

5. The isopeptide according to any one of claims 1-4, wherein $R_4$ and $R_5$ independently comprise an aromatic carbon ring.

6. The isopeptide according to claim 5, wherein the aromatic ring comprises a 6- or 12 membered ring or a substituted form thereof.

7. The isopeptide according to claim 6, wherein the ring is substituted with at least one of: a lower alkyl, alkoxy, hydroxyl, carboxy, amine, thiol, hydrazide, amide, halide, hydroxyl, ether, amine, nitrile, imine, nitro, sulfide, sulfoxide, sulfone, thiol, aldehyde, keto, carboxy, ester, an amide group; a seleno group, a thio group and derivatives thereof.

8. The isopeptide according to claim 6, wherein the aromatic ring is substituted with at least one of: a lower alkyl, alkoxy, halide, nitrile and nitro group.

9. The isopeptide according to claim 6, wherein the ring is substituted with at least one of: an alkoxy and nitro group.

10. The isopeptide according to claim 6, wherein the ring comprises about 1 to 5 substitutions.

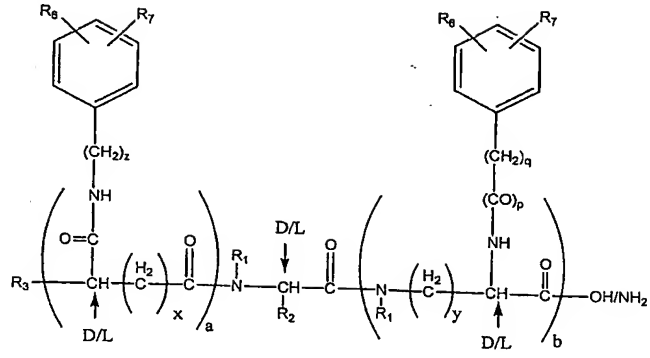
11. The isopeptide according to claim 6, wherein the ring comprises about 1 to 2 substitutions.

12. The isopeptide according to claim 5, wherein the aromatic carbon ring is selected from the group consisting of: a benzyl, phenyl, and napthyl group.

13. The isopeptide according to claim 12, wherein the aromatic carbon ring is a benzyl group.

14. The isopeptide of any one of claims 1-13, wherein $R_1$ is H; $R_2$ is the side chain of the amino acid glycine or alanine; $R_3$ is H or $NH_2$; $R_4$ and $R_5$ comprise a benzyl group substituted with at least one of a nitro or methoxy group.

15. An isopeptide represented by the general formula II:



where, if a is 1 then b is 0;
if a is 0 then b is 1;
x and y independently are 1-7;
z is 1-6;
q is 0-6;
p is 0-1
$R_1$ is H or $CH_3$

$R_2$ is the side chain of an amino acid selected from the group consisting of alanine, arginine, asparagine, aspartic acid, cysteine, glutamic acid, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, and valine;

$R_3$ is selected from the group consisting of: H, $NH_2$, NHR, $NR_2$, $^+NR_3$, OH, SH, RO, RS, RSO, $RSO_2$, COR, CSR, COOH, COOR, $CONH_2$, CONHR, $CONR_2$, OCOR, and SCOR, wherein R = alkyl, alkenyl, aryl, aralkyl, or cycloalkyl; and

$R_6$ and $R_7$ are independently selected from the group consisting of H, alkyl, alkenyl, aryl, aralkyl, halogen, CN, $NO_2$, alkoxy, aryloxy, aralkyloxy, thioalkoxy, thioaryloxy, thioaralkyloxy, $+S(CH_3)_2$, $SO_3H$, $SO_2R$, $NH_2$, NHR, $NR_2$, $^+NR_3$, OH, SH, COOH, COOR, $CONH_2$, CONHR, $CONR_2$, $CH_2OH$,. NCO, NCOR, NHOH, $NHNH_2$, NHNRH, $CH_2OCOR$, $CH_2OCSR$, COR, CSR, CSOR, $CF_3$, and $CCl_3$, and wherein R is alkyl, alkenyl, aryl, aralkyl, or cycloalkyl.

16. The isopeptide according to claim 15, wherein $R_1$ is H.

17. The isopeptide according to claim 15 or claim 16, wherein $R_2$ is the side chain of an amino acid selected from the group consisting of glycine and alanine.

18. The isopeptide according to any one of claims 15-17, wherein $R_3$ is H or $NH_2$.

19. The isopeptide according to any one of claims 15-18, wherein $R_6$ and $R_7$ are independently selected from the group consisting of H, alkyl, halogen, CN, $NO_2$, alkoxy and CF3.

20. The isopeptide according to claim 19, wherein $R_6$ and $R_7$ are independently selected from the group consisting of H, $NO_2$ and alkoxy.

21. The isopeptide of any one of claims 15-20, wherein $R_1$ is H; $R_2$ is the side chain of the amino acid glycine or alanine; $R_3$ is H or $NH_2$; $R_6$ and $R_7$ are independently selected from H, $NO_2$ and methoxy.

22. The isopeptide according to any one of claims 1 to 21, wherein the isopeptide comprises a free N-terminal, a free C-terminal, or both a free N- and C-terminal.

23. The isopeptide according to claim 1 or claim 15, wherein the hydrophobic group is 6-membered aromatic carbon ring comprising a substituent at the 4-position.

24. The isopeptide according to claim 23, wherein the substituent is selected from the group consisting of a methyl, ethyl, t-butyl, c-hexyl, phenyl, n-butyl, n-hexyl, n-octyl, ethoxy, t-butoxy, phenoxy, butoxy, benzyloxy, n-hexyloxy, and n-octyloxy group.

25. The isopeptide according to claim 23, wherein the substituent is selected from the group consisting of an alkoxy and nitro group.

26. The isopeptide according to claim 23, wherein $R_1$ is H, $R_2$ is the side chain of an amino acid selected from the group consisting of glycine or alanine; $R_3$ is H or $NH_2$; the 6-membered aromatic carbon ring is a benzyl group; and the substituent at the 4-position is a nitro or alkoxy group.

27. The isopeptide according to any one of claims 9, 20, 25 or 26, wherein an alkoxy group is a methoxy group.

28. An isopeptide represented by the general form:

H – first amino acid moiety – second amino acid moiety – OH, wherein

the first amino acid moiety comprises an amino acid selected from the group consisting of glycine, asparagine and glutamine;

the second amino acid moiety comprises an amino acid selected from the group consisting of lysine, alanine and sarcosine;

the first or second amino acid moiety comprises a 6-membered aromatic carbon ring.

29. The isopeptide according to claim 28, wherein the first amino acid moiety comprises an amino acid glycine or glutamine and the second amino acid moiety comprises an amino acid lysine or alanine.

30. The isopeptide according to claim 28 or claim 29, wherein where the first amino acid moiety comprises an aromatic carbon ring, the amino acid is glutamine.

31. The isopeptide according to claim 30, wherein the second amino acid moiety comprises the amino acid alanine.

32. The isopeptide according to claim 28 or claim 29, wherein where the second amino acid moiety comprises an aromatic carbon ring, the amino acid is lysine.

33. The isopeptide according to claim 32, wherein the first amino acid moiety comprises the amino acid glycine.

34. The isopeptide according to any one of claims 28 to 33 wherein the aromatic carbon ring is a benzyl or benzoyl group.

35. The isopeptide according to any one of claims 28 to 34, wherein the aromatic carbon ring is substituted with at least one of a lower alkyl, alkoxy, halide, nitrile and nitro group.

36. The isopeptide according to claim 35, wherein the aromatic carbon ring is substituted with at least one of an alkoxy and nitro group.

37. The isopeptide according to any one of claims 28 to 36, wherein the aromatic carbon ring is substituted at the 4-position.

38. The isopeptide according to any one of claims 1-37, wherein the isopeptide is an antiarrhythmic drug.

39. The isopeptide according to any one of claims 1-38, wherein the isopeptide binds to an hPepT1 transporter or a biologically active fragment thereof.

40. The isopeptide according to any of claims 1-39, wherein the isopeptide has a half-life in an *in vitro* plasma stability assay of more than about 30 minutes.

41. The isopeptide according to any of claims 1-39, wherein the isopeptide has a half-life in an *in vitro* plasma stability assay of more than about 48 hours.

42. The isopeptide according to claim 1-41, wherein the isopeptide binds to a tissue, cell, or cell fraction that is a site of action for an antiarrhythmic peptide.

43. The isopeptide according to claim 42, wherein the isopeptide is a modulator of the function of the tissue, cell, or cell fraction.

44. The isopeptide according to claim 42, wherein the isopeptide antagonizes the function of the antiarrhythmic peptide.

45. The isopeptide according to claim 42, wherein the isopeptide agonizes the function of the antiarrhythmic peptide.

46. The isopeptide according to claim 42, wherein the isopeptide is a modulator of a receptor of the antiarrhythmic peptide.

47. The isopeptide according to claim 42, wherein the isopeptide increases the time to an AV block in a standard calcium-induced arrhythmia assay.

48. The isopeptide according to any one of the preceding claims, wherein the isopeptide is selected from the group consisting of the isopeptides shown in Table 1.

49. The isopeptide according to any one of the preceding claims, wherein the isopeptide is selected from the group consisting of the isopeptides shown in Table 2.

50. A method for modulating gap junctional communication in a population of cells comprising administering an effective amount of an isopeptide as defined in any one of claims 1-49 to the population of cells thereby modulating gap junctional communication between the cells.

51. The method according to claim 50, wherein the isopeptide is as defined in claim 49.

52. The method according to claim 50 or claim 51, wherein administering is performed *in vivo*.

53. A method of preventing and/or treating a pathological condition involving impaired gap junctional communication comprising administering to an individual in need thereof a therapeutically effective amount of an isopeptide as defined in any one of claims 1 to 49.

54. The method according to claim 53, wherein the isopeptide is as defined in claim 48.

55. The method according to claim 53, wherein administration is parenteral.

56. The method according to claim 53, wherein the administration is oral.

57. The method according to claim 53, wherein the individual is a human being.

58. The method according to claim 53, wherein the pathological condition is selected from the group consisting of a cardiovascular disease, inflammation of airway epithelium, a disorder of alveolar tissue, bladder incontinence, impaired hearing, an endothelial lesion, diabetic retinopathy, diabetic neuropathy, CNS, i.e. ischemia of the central nervous system, ischemia of the spinal cord, brain, brain stem, spinal cord, dental tissue disorder, kidney disease, failure of bone marrow transplantation, wound, erectile dysfunction, neuropathic pain, subchronic and chronic inflammation, cancer, transplantation failure; a condition caused by an excess of reactive oxygen species and/or free radicals and/or nitric oxide.

59. Use of an isopeptide as defined in any one of claims 1 to 49 for the manufacture of a medicament for the prevention and/or treatment of a pathological condition involving impaired gap junctional communication comprising administering to an individual in need thereof a therapeutically effective amount of said.

60. The use according to claim 59, wherein the isopeptide is as defined in claim 49.

61. The use according to claim 59, wherein administration is parenteral.

62. The use according to claim 59, wherein the administration is oral.

63. The use according to claim 59, wherein the individual is a human being.

64. The use according to claim 59, wherein the pathological condition is selected from the group consisting of a cardiovascular disease, inflammation of airway epithelium, a disorder of alveolar tissue, bladder incontinence, impaired hearing, an endothelial lesion, diabetic retinopathy, diabetic neuropathy, CNS, i.e. ischemia of the central nervous system, ischemia of the spinal cord, brain, brain stem, spinal cord, dental tissue disorder, kidney disease, failure of bone marrow transplantation, wound, erectile dysfunction, neuropathic pain, subchronic and chronic inflammation, cancer, transplantation failure; a condition caused by an excess of reactive oxygen species and/or free radicals and/or nitric oxide.

65. A pharmaceutical composition comprising the isopeptide defined in any one of claims 1-49 and a pharmaceutical carrier.

66. The pharmaceutical composition according to claim 65, wherein the composition is parenteral administrable.

67. The pharmaceutical composition according to claim 65, wherein the composition is orally administrable.